ISSN 0254-380 X

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समुद्री मात्स्यिकी सूचना सेवा
MARINE FISHERIES INFORMATION SERVICE

No. 135 DECEMBER 1994

तकनीकी एवं विस्तार अंकावली
TECHNICAL AND EXTENSION SERIES

केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान, कोचिन, भारत
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE COCHIN, INDIA

भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

समुद्री मात्स्यिकी सूचना सेवा : समुद्री मात्स्यिकी पर आधारित अनुसंधान परिणामों को आयोजकों, मत्स्य उद्योगों और मत्स्य पालकों के बीच प्रसार करना और तकनोलजी का प्रयोगशाला से श्रमशाला तक हस्तांतरित करना इस तकनीकी और विस्तार अंकावली का लक्ष्य है।

THE MARINE FISHERIES INFORMATION SERVICE : Technical and Extension Series envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers and transfer of technology from laboratory to field.

Abbreviation - *Mar. Fish. Infor. Serv., T & E Ser.*, No. **135** : December 1994

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PROSPECTS FOR DEVELOPING CULTURE OF EDIBLE OYSTER, *CRASSOSTREA MADRASENSIS* AND GREEN MUSSEL, *PERNA VIRIDIS* ALONG KAKINADA COAST, ANDHRA PRADESH

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Introduction

Around Kakinada in Andhra Pradesh the edible oyster, *Crassostrea madrasensis* beds are found at Kakinada Fisheries Harbour, Chollangi and Uppada. This species spawns almost throughout the year with minor variations. The technology of oyster culture has been developed at the Tuticorin Research Centre of CMFRI. Since aquaculture is location specific, in order to test the viability of this technology under the conditions prevailing at Kakinada, experimental study on edible oyster culture was taken up at Kakinada. This enables us to suggest modifications that may be required in the culture technology to suit the local conditions.

Earlier attempts on location testing for oyster culture in this area were unsuccessful as spat collectors were often disturbed by fishermen, resulting in their loss. In the current experiments, ren culture method was attempted. This work was carried out by giving good publicity at the Kakinada Fisheries Harbour and in the process, considerable awareness was generated among the fishermen resulting in good protection to the rens.

Studies on Edible Oyster Culture

Experiment - I

The rens were prepared at Tuticorin, using oyster shells as cultch material. The total length of each ren was about 70 cm with 5 to 6 oyster shells as cultch. About 6 to 7 hatchery raised oyster spat were attached on the cultch. Twelve such rens were transported to Kakinada on 26.2.1992 and suspended at Kakinada Fisheries Harbour from a horizontal rope, which was tied to the two concrete pillars of the harbour jetty. This site was advantageous as it offered protection to the rens.

The size (height) of oyster spat at the time of stocking at Kakinada ranged from 10 to 55 mm with a mean of 27mm. The growth of oysters was regularly monitored. The oysters were cleaned of foulers like barnacles, serpulids etc., at monthly intervals. The oysters were harvested on 2.11.'92 after a gap of 255 days. The actual culture period from the day rens were kept for settlement in the hatchery till harvest was about 280 days. At harvest the size of oysters ranged from 40 to 105 mm with a mean of 72 mm. The weight ranged from 35 g to 148 g with a mean of 68.6 g. The meat weight ranged from 2.4 g to 21 g with a mean of 6.5 g and an average meat yield of 9.6% (Table 1).

TABLE 1. *Length-wise meat yield of* C. madrasensis *(culture period : February - November 1992)*

Length group (mm)	Average weight (g)	Average meat weight (g)	% of meat
50-60	41.0	2.5	6.1
60-70	53.4	5.2	9.7
70-80	69.3	6.8	9.8
80-90	85.0	8.7	10.2
90-100	107.0	9.6	9.0

Two rens were physically damaged due to frequent hitting to the pillars of the jetty. The survival rate of oysters was 83%. Total weight of harvested oysters was 26.4 kg shell-on which works out to 2.64 kg/ren of 0.75 m length. Thus the production per metre ren was estimated at 3.5 kg.

Experiment - II

In this experiment, 18 rens were prepared each with 6 shells as cultch at Kakinada. The shells used were those of green mussel and window-pane oyster apart from edible oyster (Fig.1). The rens were suspended at the fisheries harbour in the middle of February'92 at the same location where the first experiment was conducted (Fig 2). The settlement of oyster spat was observed only at the end of March. Thereafter the growth of oyster spat was monitored every month. They were cleaned for fouling organisms like barnacles and serpulid

Fig. 1. Rens made of oyster shells.

worms at monthly intervals. Further settlement of oyster spat was observed continuously and they were removed to avoid overcrowding the rens (Fig 3). The oysters were harvested by the middle of september, 1993 i.e., 7 months after suspending

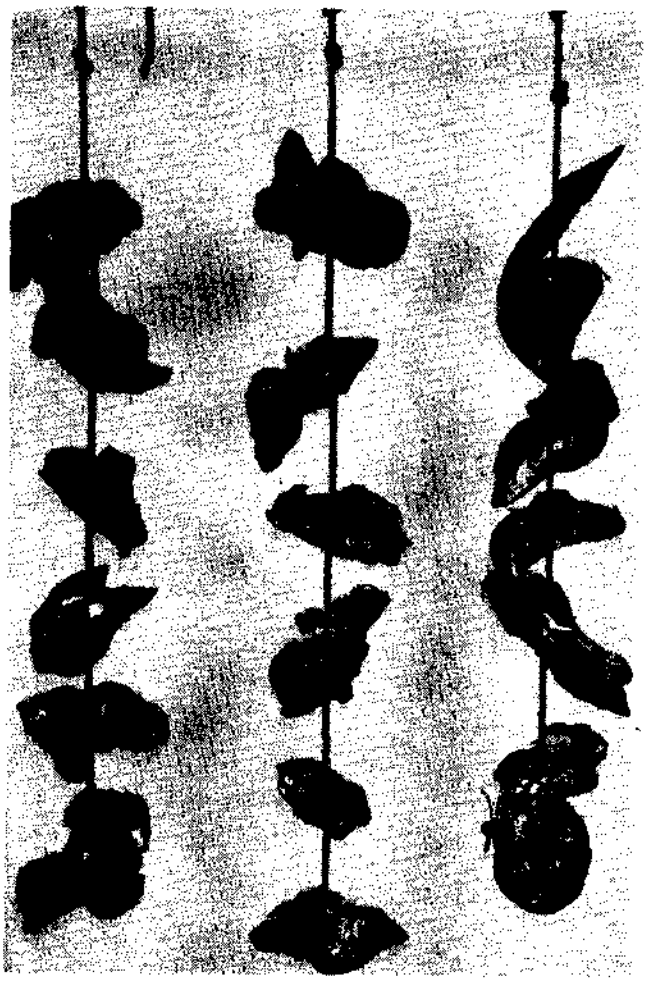

Fig. 2. Rens with oysters settled.

Fig. 3. A close-up view of an oyster shell ren with settled oysters. Note that it is cleaned of foulers and oyster spat.

the rens at the culture site (Fig 4). The effective culture period can be considered as six months, as spat settlement took more than a month.

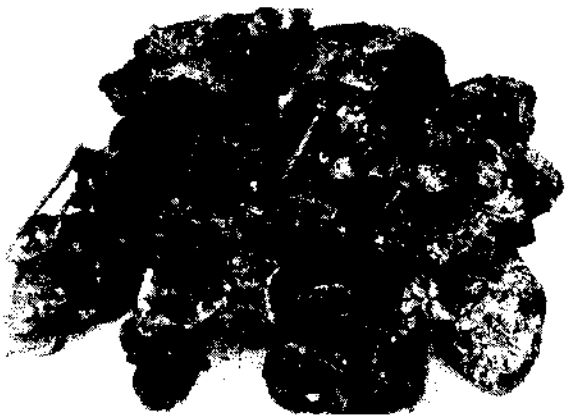

Fig. 4. Harvested rens with oysters and few green mussels.

The height of oysters at the time of harvest ranged from 28 to 105 mm with a mean of 66 mm. The weight ranged from 10 g to 112 g with a mean of 45.2 g. The mean meat weight was 4.1 g which works out to a meat yield of 9% (Table 2).

TABLE 2. *Length-wise meat yield of* C. madrasensis *(Culture period : February - August 1993)*

Length group (mm)	Average weight (g)	Average meat weight (g)	% of meat
30-40	10.1	1.3	12.4
40-50	13.6	1.5	11.3
50-60	25.4	2.5	9.7
60-70	43.1	4.2	9.7
70-80	62.7	5.7	9.2
80-90	78.5	6.3	8.0
90-100	99.8	7.6	7.6
100-110	101.0	9.0	8.9

On an average, six oysters were retained on each shell. The production was 1.63 kg/0.7 m ren which gives an estimated production of 2.32 kg/1 m ren/ 6 months.

Effect of curing on settlement

In the course of the second experiment, some shells of window-pane oysters were kept immersed in seawater for about two weeks before they were suspended for oyster spat collection. It has been observed that the settlement of spat on these shells was quick and firm when compared to untreated shells. This may be due to the formation of "Primary film" on the shells which will facilitate easy settlement of larvae (Perkins, E.J. 1974. *The Biology of Estuaries and Coastal Water*. Academic Press, 678 pp).

Environmental conditions

The salinity temperature and oxygen values of the sea water at culture site were monitored throughout the culture period. The salinity ranged from 12.45 ppt to 34 ppt, the temperature from 23 to 27.5 °C and the oxygen from 3.0 to 5.2 ml/l. There were no wide fluctuations in these parameters.

Remarks

In the first experiment where the hatchery-raised oyster spat were transported from Tuticorin, they attained a mean height of 72 mm in about 9 months. In Tuticorin area the edible oysters attained a size of 80-90 mm in one year (Nagappan Nayar, K. 1987. *Bull. CMFRI , No.* 38 : 59 - 63). The meat content in both places was about 10%. In the second experiment, the effective culture period was reduced to six months and the oysters attained a mean height of 66 mm with 9% meat yield. The oyster can be marketed at this size. As there are vast shallow water bodies in this area, apart from the Kakinada Bay, the present study indicates the suitability of developing this area for edible oyster culture and a seasonal crop of 6-9 months duration can be raised. It may be prudent to use the window-pane oyster shells as cultch material in the preparation of rens as they are locally available in sufficient quantities compared to oyster shells. Moreover window-pane oyster shells offer more surface area for the spat to settle and grow. Utilization of the cured shells may reduce the effective suspension period of the rens apart from yielding good results.

Studies on green mussel

A good *Perna viridis* (green mussel) bed was found in the Kakinada Fisheries Harbour. While culturing *C. madrasensis* in the Kakinada Fisheries Harbour area, green mussel spats settled on the ropes of oyster rens. The mussel spat were observed on the rens in July 1992 at an average length of 16 mm i.e., about one month old. They had grown to a length range of 33 to 81 mm and a mean length of 49.4 mm by the middle of November. The mean weight was 13.3 g. As the oysters were harvested, the mussels were removed from the rens and kept in 3 elongated nylon bags of 1 m length and 15 cm width (Fig 5). The bags were vertically suspended in the same area. The mussels again got attached to each other through the byssus threads and formed bunches within the bags (Fig 6). By the end of March 1993, these mussels had grown to a length range of 60-115 mm with a mean length of 80.1 mm. The weight ranged from 19 to 138 g with a mean value of 67.7 g. The average meat yield was 21.6% of the total weight (Table 3). It was seen that the meat yield was better at 80 mm length, indicating that this length group was the desired size for higher yield at harvest.

In the second experiment, oyster rens were suspended in February 1993. The green mussel spat started setting in April and reached a mean length of 65 mm by the end of August i.e., in about 4 months. The mean weight was 33 g, meat weight 9.2 g and the percentage of meat yield was about 28%.

Remarks

The growth rates of green mussel observed in

Fig. 5. Meshed nylon bags with green mussels, before suspending at the culture site.

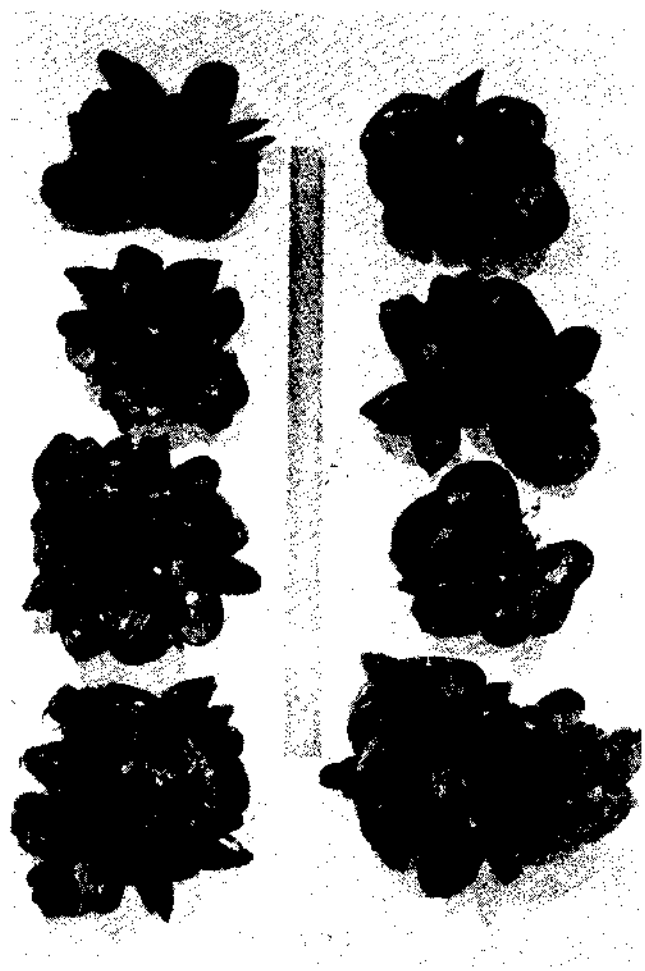

Fig. 6. Clusters of green mussels removed from nylon bags at the time of harvesting.

TABLE 3. *Length-wise meat yield of* Perna viridis *(culture period : July '92 - March '93)*

Length group (mm)	Average weight (g)	Average meat weight (g)	% of meat
20-30	2.5	0.35	14.0
30-40	7.3	1.05	14.6
40-50	9.2	1.85	20.1
50-60	19.0	4.18	22.0
60-70	34.9	7.54	21.6
70-80	63.2	12.77	20.2
80-90	77.5	17.82	23.0
90-100	96.1	20.73	21.6
100-110	107.0	22.30	20.8
110-120	138.2	27.33	19.8

TABLE 4. *Length-wise meat yield of* Perna viridis *(culture period : March-August 1993)*

Length group (mm)	Average weight (g)	Average meat weight (g)	% of meat
30-40	6.5	1.75	26.9
40-50	10.3	3.17	30.7
50-60	15.3	4.50	28.7
60-70	27.6	8.10	29.3
70-80	41.7	11.20	26.9
80-90	47.0	13.50	28.7
90-100	70.5	17.00	24.1

the present experiments were good and comparable to 64 mm in 8 months at Ennore, 66 mm in 5 months at Vakalapudi near Kakinada and 66 mm in 6 months on the natural beds at Kakinada (Narasimham K.A. 1980. *Bull. CMFRI*, No.29 : 10-17). At Calicut the harvestable size of 80 mm was reached in five months after seeding at 20-30 mm, by raft culture method (Kuriakose P.S. 1980. *Bull. CMFRI*, No.29 : 33-38). The production per nylon mesh bag of 1 m x 15 cm was about 4 kg and mortality was negligible.

This study indicates the possibility of culturing the green mussel in nylon net bags of about one metre length in shallow water bodies like the Kakinada Bay. In order to avoid clustering, to begin with, the mussel spats can be held in small mesh narrow bags, so that they attach together and take a lognitudinal cylindrical shape. The external nylon bag may be periodically replaced by a wider mesh bag to accommodate the growing mussels. This method helps to prevent the dropping of the mussels. The nylon bags are reusable and this method of culture can be practised in shallow waters (2m depth) with the length of the mussel bag restricted to about 1m.

We thank Dr. K.A. Narasimham, Head Molluscan Fisheries Division for critically going through the manuscript and suggesting improvements. We are also grateful to Shri. G. Subbaraju, Officer-in-Charge, Kakinada Research Centre of C.M.F.R.I., for providing necessary facilities.

TRADITIONAL FISHERMEN IN LOW INCOME TRAP — A CASE STUDY IN THANJAVUR COAST OF TAMIL NADU

R. Sathiadhas, K.K.P. Panikkar and A. Kanakkan

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Introduction

The technological changes and consequent improvement in fishing methods like the introduction of synthetic nets and motorisation of country crafts have considerably paved the way to reduce the stress and strain of traditional marine fishing and to a certain extent improved the living conditions of fishermen. Many developmental schemes have also been launched by the government with the intention of improving the socio-economic status of fishermen. No doubt, some of these schemes helped to increase fish production and also employment generation in the coastal rural sector. But several recent studies conducted at selected fishing villages along the Indian coast indicate that the benefit of increase in fish production and higher fish price have mainly benefitted the middlemen and did not percolate to the fishermen who are the actual producers of fish.

The unequitable distribution of income and consequent widening of the gap between the rich and poor in marine fisheries sector have been a topic of debate among the planners and social scientists. It is argued that the intensive mechanisation programme has even deprived the traditional fishermen of their legitimate claim for fishing in the near shore areas. There are also frequent conflicts between the mechanised and non-mechanised fishermen over their fishing rights. The continuous monitoring of the situation is highly essential and the C.M.F.R.I., regularly conducts socio-economic surveys of fishermen families at selected centres of various regions of our country. The present investigation was carried out at Keechankuppam and Mallipattinan villages in Thanjavur coast of Tamil Nadu with the following specific objectives :

— to study the socio-demographic status of fishermen pertaining to housing, literacy, family size and occupational pattern,

— to assess the ownership and level of investment of fishing equipments,

—to analyse the income and expenditure pattern of fishermen families and extent of indebtedness along with credit facilities available in the village and

—to find out the major constraints confronted by the fishermen inhibiting their socio-economic development and to suggest necessary remedial measures.

Data and methodology

A preliminary investigation was carried out in the fishing villages along Thanjavur coast and information pertaining to fishermen families, craft and gears, fishing season, marketing pattern and availability of infrastructure facilities were collected by contacting panchayat or village level leaders. On the basis of this preliminary investigation and considering the predominance of traditional fishermen families, Keechankuppam village near Nagapattinam and Mallipattinam near Pattukottai were selected for detailed socio-economic survey. The household survey was carried out during 1990-'91 along with the investigations on costs and earnings of different craft-gear combinations. The survey was undertaken with the help of local

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enumerators hailing from fishermen community of the respective villages.

Housing pattern

Housing is one of the major problems confronted by the coastal fishing communities. Most of the fishermen do not have any land ownership. They live in huts all along the sandy beaches of the coast. A dwelling place with a thatched roof and having either a mud wall or an enclosure made of *thatties* is classified as hut. About 51% of fishermen households at Mallipattinam and 42% at Keechankuppam are living in huts. For the present study a dwelling with a thatched roof and brick wall is considered as *kutcha* house and 34% and 45% of families have this type of houses in Mallipattinam and Keechankuppam fishing villages respectively. Only about 15% of the houses at Mallipattinam and 13% at Keechankuppam come under the category of *pucca* houses having tiled roof and brick wall. The survey indicates that the absence of land ownership and inadequate earnings as well as loan facilities are the factors responsible for the poor housing facilities along the coastal belt.

TABLE 1. *Village-wise distribution of different types of houses*

Type of	Mallipattinam		Keechankuppam	
houses	No. of houses	Per cent	No. of houses	Per cent
Hut	113	51	184	42
Kutcha	74	34	197	45
Pucca	33	15	60	13
Total	220	100	441	100

Population, literacy and employment

The details of population, size of family, educational status, literacy and occupational pattern are given in Table 2. The average size of a family works out at 5 in both the fishing villages. The literacy rate is very poor and far less than the state average of 47%. Less than 20% of fishermen population both at Mallipattinam and Keechankuppam have at least primary (a pass in V std.) level of education.

With regard to employment status, about 30% of fishermen at Mallipattinam and 32% at Keechankuppam have some regular occupation. It is worth to note that among these 70%, at Mallipattinam and 74% at Keechankuppam are engaged in active fishing. Women are engaged only in fishery related activities. About 10% of the employed at Mallipattinam and 23% at Keechankuppam are women and they are engaged mostly in activities like fish marketing, processing,

TABLE 2. *The distribution of population, size of family, literacy and occupation pattern*

Items	Mallipattinam	Keechankuppam
1. No. of households	220	441
2. Population details		
Adults		
Male	346	679
Female	344	657
Children		
Male	179	382
Female	195	335
Total	1064	2053
3. Average size of family	5	5
4. Educational status		
Primary	110(72%)	68(72%)
Middle	22 (14%)	17 (18%)
Higher secondary and above	22 (14%)	10 (10%)
5. Occupational status		
Active fishing	224 (69%)	489 (74%)
Fishery related activities		
Male	42 (13%)	3 (1%)
Female	29 (9%)	152 (23%)
Other activities	29 (9%)	14 (2%)

Figures in brackets indicate percentages.

drying and curing. Due to the overall poverty of marine fishermen families, many children of school going age are also involved in fishing or fishery related activities.

Ownership pattern of means of production

Most of the fishermen at Mallipattinam and Keechankuppam villages have no sufficient fishing implements. About 80% of the fishermen households at Mallipattinam and 33% at Keechankuppam have ownership on some sort of means of production. The ownership pattern of fishing equipments at Mallipattinam is given in Table 3. Both mechanised and non-mechanised plank built boats are operating at Mallipattinam landing centre. The mechanised boats operate gillnets and 11% of fishermen households have ownership of the same. Non-mechanised plank built boats operate *Koivalai*. On an average fishermen require 20 pieces of this net for sufficiently efficient operation of these boats. However, most of the fishermen do not have enough number of pieces of *Koivalai*. About 50% of the fishermen households own P. B. boats and 60% of them have less than 10 pieces of gillnets (*Koivalai*). Among the fishermen households, 43 of them own only nets and usually they do join as workers along with their nets in other's boats.

Keechankuppam is the adjoining fishing village of Nagapattinam which is a major mechanised

TABLE 3. *Ownership pattern of means of production at Mallipattinam*

Particulars of crafts & gear	Ownership (No. of families)		Per cent
1. Mechanised boat & net	24		14
2. Nets alone	43		25
3. Plank built boat with less than 5 pieces of net	2		
4. plank-built boat with 5 to 7 pieces of net	50		
" 8 to 10 "	26		
" 10 to 15 "	15	108	61
" 15 to 20 "	8		
" 20 to 25 "	5		
" 25 to 30 "	2		
Total	175		100

landing centre in Tamil Nadu. Hence among those who have fishing equipments, a considerable number of fishermen households (38%) possess mechanised boats (Table 4). However, majority of the fishermen still depend on catamaran fishing for their livelihood. It is well established that several resource specific gillnets ae required for doing marine fishing throughout the year depending upon the seasonal availability of different varieties of fish for getting better economic returns. About 75% of fishermen having catamarans could not operate their units effectively throughout the year due to lack of sufficient nets. It is worth to note that only 26% of catamaran owners have more than three types of net.

TABLE 4. *Ownership pattern of means of production at Keechankuppam*

Particulars of crafts & gear	Ownership (No. of families)	Per cent
1. Catamaran alone	2	1
Catamaran + 1 net	17	12
Catamaran + 2 nets	48	33
Catamaran + 3 nets	22	15
Catamaran + 4 or more nets	2	1
2. Mechanised boat & net	55	38
Total	146	100

Capital investment on fishing equipments

The investment pattern of fishermen households on fishing equipments at Mallipattinam and Keechankuppam village is given in Table 5. Among the fishermen households, 25% at Mallipattinam and 53% at Keechankuppam having ownership of means of production, invested only less than Rs. 5,000/- on fishing implements. At Keechankuppam 18% and at Mallipattinam 17% of the families invested more than Rs. 50,000 each which is mainly on mechanised fishing units. The study

TABLE 5. *Family-wise break up of capital investment on fishing equipments*

Capital Investment (Rs)	Mallipattinam		Keechankuppam	
	No. of families	Per cent	No. of families	Per cent
Less than 5,000	37	25	167	53
5,001 - 10,000	56	39	64	20
10,001 - 15,000	8	6	23	8
15,001 - 25,000	10	7	1	-
25,001 - 50,000	8	6	2	1
50,001 - 75,000	8	6	2	1
75,001 - 1 lakh	12	8	6	2
1 lakh and above	4	3	49	15
Total	143	100	314	100

reveals that 64% of owners at Mallipattinam and 73% of owners at Keechankuppam have invested less than Rs. 10,000/- on fishing equipments.

Annual and per capita income

The average annual income of a fisherman household in Mallipattinam works out at Rs. 11,778 and Rs. 8,074 in Keechankuppam, the per capita income being Rs. 2,356/- in the former and Rs. 1,615/- in the latter places respectively. The classification of fishermen families based on major occupation and annual income is given in Table 6. In Mallipattinam 70% of the fishermen households are earning maximum income from active fishing, 19% from fishery related activities and 11% from other activities and in Keechankuppam 81% from active fishing 18% from fishery related activities and the remaining from other activities.

Majority of the fishermen households having fishing as major occupation earn an annual income in the range of Rs. 5,000 - 15,000 at Mallipattinam. However, in Keechankuppam, majority of the households having active fishing as their major occupation earn in the range of Rs. 3,000-9,000 per annum. Among the active fishermen, most of the households having fishery related activities as their main occupation earn less than Rs. 5,000 per annum in both the places. The low annual income from fishery related activities is mainly due to the seasonal nature of fishing activities.

Annual and per capita expenditure

The annual average household expenditure of a fishermen family works out to Rs. 8,685 at Mallipattinam and Rs. 6,508 at Keechankuppam. The annual per capita expenditure comes to about Rs. 1,737 at Mallipattinam and Rs. 1,302

TABLE 6. *Classification of fishermen families based on major occupation and annual income*

Income groups (Rs.)	Fishing	Mallipattinam			Keechankuppam			
		Fishing related activities	Others	Total	Fishing	Fishery related activities	Others	Total
Less than 3,000	2	10	4	16	18	42	1	61
3,001 - 5,000	15	10	7	32	94	26	-	120
5,001 - 7,000	30	8	3	41	96	3	-	99
7,001 - 9,000	31	5	5	41	73	5	5	83
9,001 - 12,000	22	4	4	30	28	1	-	29
12,001 - 15,000	19	2	-	21	10	-	-	10
15,001 - 20,000	12	1	-	13	18	1	-	19
20,001 - 25,000	11	1	-	12	7	1	-	8
25,001 - 30,000	4	-	3	7	9	-	-	9
30,001 - 35,000	4	-	-	4	1	-	-	1
35,001 - 40,000	-	-	-	-	2	-	-	2
40,001 and above	3	-	-	3	-	-	-	-
Total	153	41	26	220	356	79	6	441

Keechankuppam. The average expenditure pattern of a fisherman household on various items like food, clothing, education etc. for both the centres have been worked out and given in Table 7. The expenditure on food items alone works out to 58% and 85% of the family budget of Mallipattinam and Keechankuppam villages respectively. It is worth to mention here that a considerable number of fishermen households take loans for household expenditure particularly to tide over the lean season. The low level of spending for education and medical purposes clearly indicates their socio-economic backwardness.

TABLE 7. *Average annual expenditure pattern of a fisherman household*

Items	Mallipattinam		Keechankuppam	
	Expenditure (Rs)	Per cent	Expenditure (Rs)	Per cent
Food	5038	58	5510	85
Clothing	1326	15	508	8
Light & fuel	905	11	202	3
Education	77	1	79	1
Medical	704	8	112	2
Entertainment	288	3	97	1
Others	347	4	-	1
Total	8685	100	6508	100

Indebtedness and credit facilities

Only a few households have reported meagre savings after meeting the production and consumption expenditure and many are therefore compelled to borrow money either for production or consumption purposes or for both. Out of 220 families in Mallipattinam, 83 (38%) are in debt and out of 441 families in Keechankuppam 137 (31%) are in debt. The total amount of debt incurred by the fishermen families of Mallipattinam and Keechankuppam worked out to Rs. 9.5 lakhs and 2.5 lakhs respectively. The average outstanding debt per indebted household in Mallipattinam and Keechankuppam worked out at Rs. 11,456 and Rs. 1,825 respectively. Although many fishermen are in dire need of credit they could not get it from the formal or informal capital market as they are unable to fulfil the conditions imposed.

The details of credit extended by different agencies and the aggregate outstanding cash dues of fishermen at Mallipattinam and Keechankuppam are given in Table 8. Fish traders and money lenders ae the most important source of credit for the fishermen in both the places. Fish traders some time act as money lenders and advance loan to fishermen mainly to do transaction of fish caught by such loanees and they used to recover part of the loan when buying the catch at price fixed by them.

TABLE 8. *Loan advanced by different agencies*

Source of credit	Amount advanced (Rs)	
	Mallipattinam	Keechankuppam
Bank	6,180 (1)	69,000 (28)
Fish trader	5,32,800 (56)	75,000 (31)
Money lender	53,500 (5)	60,000 (24)
Others	3,58,400 (38)	46,000 (18)
Total	9,50,880 (100)	2,50,000 (100)

Figures in paranthesis indicate percentage.

The role of institutional agencies in providing credit is negligible and more than 54% of the loan amount at Keechankuppam and 61% at Mallipattinam were advanced by fish traders and professional money lenders. The interest rate charged by them are comparatively high and the fishermen could not come out of the vicious circle of indebtedness.

Table 9 indicates the extent of credit supplied by different agencies to fishermen households of various income groups at Mallipattinam and Keechankuppam. Here also money lenders and fish traders form the major source of finance to the lower income groups (Rs. 10,000 and below per annum). Families in the income range of Rs. 50,000 and above per annum mostly avail loans to purchase the mechanised boats.

Mode of marketing

The mode of disposal of fish at the landing centre is auctioning. Fish being a perishable commodity, its auctioning provides maximum competition among the buyers and enable quick disposal. Both Mallipattinam and Keechankuppam landing centres are primary fish markets. However, some fishermen at Keechankuppam landing centre at times sell their catches at the adjoining mechanised landing centre at Nagapattinam. Here the number of traders participating in the auctioning is comparatively more and this enable the fishermen to realise better price than at Keechankuppam. The fish is generally auctioned by traditional auctioneers or middlemen on commission basis, who also take the responsibility for realising the sale proceeds from the traders. Most of these auctioneers are generally fisherwomen.

The system of disposal of marine fish at the landing sites by weight has not been found feasible or practical because of the great rapidity with which this perishable commodity has to be handled. Hence the sales are carried out not by weight, but by measures of heaps, lots or the size of catch. Wholesalers, retailers and bulk consumers participate in the auctioning. About 25 to 35% of the marine fish landed at Mallipattinam and Keechankuppam is marketed close to the landing centres by retailers who carry the fish either by headloads or by bicycles. The traders from Kerala also used to purchase fish here. For despatch to distant markets by trucks, fish is packed in baskets, in leaf mats or old tea chests with layers of ice. The refrigerated vans of several processing plants also visit Mallipattinam and Nagapattinam centres for collecting and transporting the exportable varieties.

Conclusion and policy implications

The study indicates that majority of fishermen along Thanjavur coast live in temporary structures like huts and kutcha houses. The average annual income of a fisherman household works out to Rs.11,778 at Mallipattinam and Rs. 8,074 at Keechankuppam, the per capita income being Rs. 2,356 and Rs. 1,615 respectively. The literacy rate works out less than 20% in both the centres which

TABLE 9. *Supply of credit by different agencies to fishermen of various income groups*

Income groups	Mallipattinam (Rs)					Keechankuppam (Rs)				
	Bank	Fish traders	Money lenders	Others	Total	Bank	Fish traders	Money lenders	Others	Total
Less than 5,000	-	34,000 (4)	2,000 (3)	-	36,000 (7)	6,000 (2)	5,000 (13)	2,000 (3)	-	13,000 (18)
5,001 - 10,000	-	5,000 (4)	5,000 (5)	-	10,000 (9)	31,000 (7)	22,000 (30)	18,000 (15)	-	71,000 (52)
10,001 - 15,000	1,180 (1)	78,800 (27)	3,000 (2)	-	82,980 (30)	7,000 (1)	30,000 (25)	23,000 (22)	-	60,000 (48)
15,001 - 20,000	-	60,000 (4)	8,000 (1)	3,000 (1)	71,000 (6)	10,000 (3)	8,000 (2)	7,000 (1)	-	25,000 (6)
25,001 - 50,000	5,000 (2)	95,000 (12)	2,500 (1)	2,50,000 (3)	3,52,500 (18)	-	-	8,000 (2)	10,000 (2)	18,000 (4)
50,001 - 75,000	-	2,50,000 (3)	18,000 (6)	1,05,400 (2)	3,73,400 (11)	- -	- -	- -	13,000 (3)	13,000 (3)
75,001 - 1 lakh	-	10,000 (1)	-	-	10,000 (1)	-	-	-	23,000 (1)	23,000 (1)
Total	6,180 (3)	5,32,800 (55)	53,500 (19)	3,58,400 (6)	9,50,880 (83)	69,000 (15)	75,000 (72)	60,000 (44)	46,000 (6)	2,50,000 (137)

Figures in brackets indicate the number of families which have availed loans.

is far below the state average of 46% (1981 census). The working population is 30% at Mallipatinam and 32% at Keechankuppam as against 36% for Tamil Nadu as a whole. The study further indicates that the traditional fishermen do not possess sufficient fishing equipments for efficient operation throughout the year. Lack of different type of resource-specific gears suiting to different seasons tend to large scale underemployment and low income. The availability of credit facilities in these villages is very poor. The role of institutional agencies in supplying credit is negligible as 54% to 61% of the loan amount is provided by private money lenders. A critical look at the expenditure pattern of fishermen household revealed that 58% and 85% of the family budget of Mallipattinam and Keechankuppam are towards food expenses. The spending priorities attached with education and medical purposes are very low clearly revealing the social and economic backwardness of fishermen families. On the basis of present study the following suggestions are given for the comprehensive development of traditional fisheries sector.

The number of annual fishing days per worker reveals that the level of employment for hired labourers as well as those not having sufficient equipment is low and they are very much underemployed. The seasonal nature of fishery and the risk and uncertainties associated with marine fishing entangled the fishermen in the low income trap. The alternative employment opportunities are very meagre and the opportunity cost of fishermen's labour is almost zero. Complementary and supplementary occupations like aquaculture, poultry and livestock and the establishment of cottage industries could help to a large extent in the economic improvement of fishermen.

The poor economic condition coupled with the less availability of finance from the institutional agencies compel them to sustain with less equipped fishing implements which in turn results in lesser returns. The commercial banks and fishermen cooperatives should formulate liberal credit policies keeping in view the peculiar nature of fishing enterprises. Majority of the fishermen are not in a position to hypothecate anything valuable or to fulfil the usual terms and conditions of the loans. All branches of nationalised banks along the coastal belt should have separate funding schemes to provide loans to fishermen. In the traditional sector the cost escalation of catamaran logs was considerable during the last few years. The fishermen who are only at a subsistence level of operation found it difficult to replace the old logs with new ones. The manifold increase in price of catamaran logs was mainly due to the involvement of middlemen. Hence the State Fisheries Department in consultation with the Forest Department can think of supplying through fishermen Co-operatives at reasonable price atleast those logs available in the government owned forest.

Lack of marketing infrastructure facilities is another factor responsible for lesser returns to fishermen. It may not be possible to start ice plants, freezing plants and other storage facilities in each fishing village. The Government can provide these facilities atleast for a cluster of villages together through the Fishermen Co-operative Societies. Steps may be taken by local Governmental agencies for providing motorable road and bus stop near the landing centre which will be immensely helpful to improve the fish marketing. The literacy rate among fishermen is very poor and activities of National Adult Education Programme (NAEP) and State sponsored "Arivoliyakkam' should be further intensified in the coastal region.

Extensive and comprehensive area development programme for the entire coastal belt is required to improve the socio-economic condition of marine fishermen. Vast stretches of coastal land near the shore line is now lying fallow without proper utilization. This can be utilised for aquaculture and also mixed planting of casuarina, cashew and coconut depending on soil condition. Just like town planning in the cities, each fishing centre/ village require comprehensive programme for its development. The immense scope of aquaculture development and tourist attraction of several spots of coastal belt should be given priority in the programmes. Allotment and development of housing sites, landing centres, auction sheds, processing plants, aquaculture farms, agriculture and social forestry and other infrastructure facilities in a planned way in each fishing village of the coastal belt will immensely help the overall development of the region. In this connection it is proposed to form a Coastal Zone Development Authority (CZDA) in each maritime state exclusively to look after the comprehensive development of the coastal region.

The Authors are grateful to Ms. V. Thanapathy, V. Sivasamy and A. Kumar, Technical Assistants of C.M.F.R.I., at Nagapattinam and Pattukottai Field Centres for their help in conducting the survey.

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PRAWN SEED COLLECTION IN SRIKAKULAM DISTRICT IN ANDHRA PRADESH*

The fishermen at most of the landing centres in Zone An.-1, the northern part of Srikakulam District upto Geddalapadu (south) use plastic mosquito nets, hand nets and nylon 'Jolly vala' or 'Toka vala' to catch prawn seeds. The nets have different colours i.e., white, green, rose, yellow and blue. 90% of the fishermen use nylon 'Jolly vala' or 'Toka vala.' The seed are collected from the surf region at a depth of 0.5 to 1.5 m. Juveniles range from 1 cm to 2cm in length. The price of 100 numbers of prawn seed ranges from Rs. 25/- to Rs. 100/-. The price of prawn seed decreases or increases depending upon the demand from the merchants. The merchants from Kakinada, Bhimavaram, Machilipatnam, Vijayawada, Rajahmundry and other centres purchase the seed. Depending upon the sea condition and availability of the prawn seed the fishermen make collections during day and night. The major centres in Srikakulam district where more prawn seed is available are Bhavanapadu, Althada, Nuwalla Revu, Manchineelapetta, Kothuru, Gollagandi, Peddakarrivanipalem, Idduvanipalem, Kotha- kalingapatnam, Donkuru and Geddalapadu. In 1994 the seed collection started from third week of June. Initially there was less prawn seed and gradually the number increased. During the last week of August, the occurrence of seed decreased. In June and July each fishermen family got an income ranging from Rs. 10,000/- to Rs. 18,000/-.

Fig. 1. 'Nylon Jolly vala' or 'Toka vala'

The method of operation of 'Jolly vala' or 'Toka vala'.

The net is set at the bottom in 0.5 to 1.5mm depth with the help of two sticks and 20 minutes after setting the net is lifted and prawn seed are collected into a plastic bucket containing sea water. The merchants transfer the prawn juveiles into polyethylene bags with sea water and add oxygen. Several bags are packed in a carton box for transporting the seeds to the fields.

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The prawn business proved the best among all the businesses because of its profit earned on investment and high value in export trade. The demand for prawns is increasing day by day. Many prawn and acquaculture farms have come up in Visakhapatnam and Vizianagaram districts of Andhra Pradesh. Many agricultural and unutilised coastal lands have been converted into prawn farms. Because of this reason demand for prawn seed has been increasing tremendously.

In Andhra Pradesh there is only one hatchery at Visakhapatnam in public sector operated by TASPARC and there are four or five hatcheries in private sector. They are not in a position to supply prawn seed to all the prawn farmers in time because of heavy demand. To meet the demand the fishermen folk started exploitation of prawn seed from the surf zone. It started at Narsapuram and Rambilli fishing villages of Visakhapatnam District and Tippavalasa and Thotapallimukkam fishing villages of Vizianagaram districts in July

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The price of the seed in July 1994 was Rs. 30/- for 100 numbers and it increased to Rs. 60/- by September 1994 due to heavy demand.

Collection of prawn seed has become a newly established endeavour of the fisherfolk particularly the aged, who have given up fishing and its idle. They have now enthusiastically entered this least risky, more profitable business of seed collection.

ON THE UNUSUAL OCCURRENCE OF *ACETES* SPP. IN THE INSHORE WATERS OF PALK BAY*

The landings of sergestid shrimp *Acetes* spp. have been recorded from both west and east coasts. Among the total non-penaeid prawns landed in India, 75-80% is comprised of *Acetes* spp. (*Mar. Fish. Infor. Ser., T & E serv.*, No.110:1991). Their landings from Maharashtra coast alone have been estimated at more than 56,000 tonnes. Similarly information on the catches of *Acetes* spp. from some parts of Tamil Nadu coast are available (*Mar. Fish. Infor. Serv., T & E Ser.* NO. 22:1979). But it appears that there is no information on the occurrence of these non-penaeid prawns along Palk Bay coast.

During the visit in connection with the collection of fish landing data, an unusual fishing for *Acetes* spp. was noticed on 21.6.'94, at M.V. Pattinam (Solia Kudi) a mechanised landing centre near Thondi along Palk Bay. The fishing for the species locally called as *Chella kooni* was conducted in the knee-deep water depth. The gears employed were mosquito nets and common sarees.

The fishing was of short duration extending for two days only. The catches were estimated at about 500 kg. Sun-dried *Acetes* spp. were sold @ Rs. 10/ per Madras measure in the market of Nambuthalai, a near-by fishing village. Here also this non-penaeid prawn is made use of in curry preparation along with vegetables as is the practies in the northern maritime states (*Mar.Fish. Infor. Serv., T & E Ser.* No. 110:1991).

Length measurements were taken for a sample of 25 specimens. The size of *Acetes* spp. ranged from 15 to 25 mm.

* **Prepared by A. Ganapthy, Regional Centre of C.M.F.R.I., Mandapam Camp - 623 520.**

ON THE FISH AUCTIONING SYSTEM IN THE VADALAREVU FISH LANDING CENTRE, ANDHRA PRADESH*

In the Vadalarevu fish landing centre in Andhara Pradesh the catches are sold by auctioning. For the purpose there are five auctioners in the village. They are selected by the elders of the village for which each auctioner has to pay Rs. 30,000 annually towards celebrating the village festival which falls in January every year.

The fisherman sort out the catch into groups in the boat itself and bring to the shore in separate baskets. The fishermen are not allowed to sell the catch directly to the merchants. Immediately after landing the acutioners start auction. But before auction, one large fish will be taken out from each fish group towards auction charges. If there are no auctioners present at the time of landing, the fishermen will have to wait until they arrive.

The acution will start from a higher to a lower amount. As the auction progress a merchant may utter a world "cho" at the level he desires to purchase the fish and if there is no further

* **Prepared by Srhi. P. Ananda Rao, Field Centre of C.M.F.R.I., Narasapur.**

bidders the auctioners will set the price at that level. After all the fishes are auctioned the auctioner will sell those fishes which he collected as auction charges. On an average the auctioners together may get about Rs. 300 per day and about Rs. 75,000 per year from which they have to pay Rs. 30,000 towards the village festival. The balance amount will be shared equally among the auctioners at the end of the festival. In this way each auctioner may get Rs. 7,000 to 8,000 every year.

SHARK LANDINGS AT KAKDWIP IN WEST BENGAL*

From 1992 onwards 8 hooks and line units using master hooks only and 6 units using gillnet in combination with hooks and line started operation from Kakdwip base. The number of such units increased to 22 from 14 during 1993. The season for operation is from October to February. During the other months they operate only gillnets of 18 to 19 m length fitted with an inboard engine horse power varying from 72 to 120. The number of hooks per unit using hooks and lines alone varied from 70 - 100 and that using gill nets along with hooks and line varied from 30 - 50. These units are operated in regions 80 - 100 km from shore and at a depth of 40 - 45 m. Mainly dolphins and eels cut into pieces of about 250 to 400 gm are used as baits. The catch details, man power, number of trips, working days, hauls and actual fishing hours are given in Tables 1 and 2. It will be found from the Tables that the efficiency of the units has little relation with man power, length of boat and horse power and the actual working hours. The catch depend more on the efficiency of the crew than the material of the unit.

In the landing centre sharks and rays are sold to merchants from Kerala and other fishes to the local merchants. Size and weight and the price fetched for different species as well as rates for fins are given in Table 3. Sharks weighing less than 5 kg are not accepted by Kerala merchants. It will be found from the table that sharks fetch more prize than rays and bigger sharks fetch prize comparable to *Hilsa* which has a high local demand. This has made the fishermen to resort to shark fishing.

The master hooks are supplied by merchants from Kerala on payment. The price of one set of master hooks and lines with 100 hooks of 15.4 cm size and accessories is given below:-

1.	Rate per 100 piece of master hooks and accessories	Rs. 14,000.00
2.	Garware rope of 0.8 cm thickness about 60 kg	Rs. 6,600.00
3.	30 pieces of 5 litre jerlican	Rs. 180.00
4.	Fitting charges	Rs. 1,000.00
	Total cost	Rs. 21,780.00

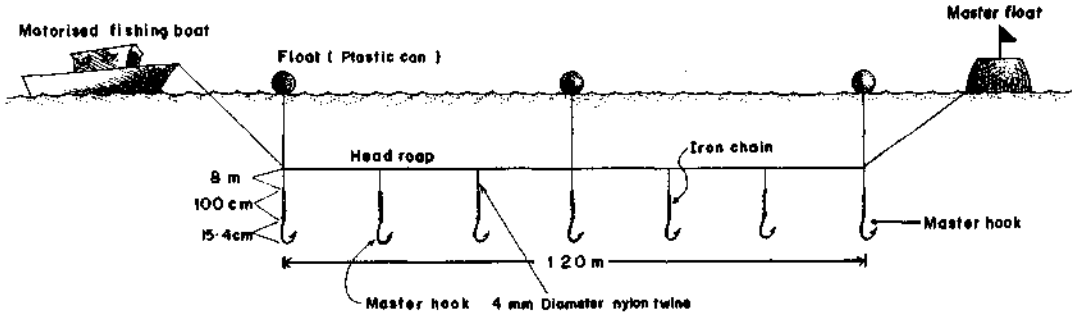
The hooks are of different sizes with numbers 0/0, 0/1, 0/2 and 0/3 and measure 6, 5, 4 and 3 inches respectively. The cost of individual hook varies from Rs. 60 to 80 depending on size.

OPERATION OF HOOKS AND LINES

Note:-

Total cost of one hook assembly is given below:-

1.	Cost of one hook of size 15.4 cm	Rs. 80.00
2.	Cost of 100 cm iron chain	Rs. 30.00
3.	Cost of plastic twine of 8m length and 0.4cm thickness (heavy monofilament twine)	Rs. 30.00
	Total cost of hook assembly	Rs. 140.00



* Prepared by Bijoy Krishna Burman, Contai Field Centre of C.M.F.R.I., Contai - 721401

bidders the auctioners will set the price at that level. After all the fishes are auctioned the auctioner will sell those fishes which he collected as auction charges. On an average the auctioners together may get about Rs. 300 per day and about Rs. 75,000 per year from which they have to pay Rs. 30,000 towards the village festival. The balance amount will be shared equally among the auctioners at the end of the festival. In this way each auctioner may get Rs. 7,000 to 8,000 every year.

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From 1992 onwards 8 hooks and line units using master hooks only and 6 units using gillnet in combination with hooks and line started operation from Kakdwip base. The number of such units increased to 22 from 14 during 1993. The season for operation is from October to February. During the other months they operate only gillnets of 18 to 19 m length fitted with an inboard engine horse power varying from 72 to 120. The number of hooks per unit using hooks and lines alone varied from 70 - 100 and that using gill nets along with hooks and line varied from 30 - 50. These units are operated in regions 80 - 100 km from shore and at a depth of 40 - 45 m. Mainly dolphins and eels cut into pieces of about 250 to 400 gm are used as baits. The catch details, man power, number of trips, working days, hauls and actual fishing hours are given in Tables 1 and 2. It will be found from the Tables that the efficiency of the units has little relation with man power, length of boat and horse power and the actual working hours. The catch depend more on the efficiency of the crew than the material of the unit.

In the landing centre sharks and rays are sold to merchants from Kerala and other fishes to the local merchants. Size and weight and the price fetched for different species as well as rates for fins are given in Table 3. Sharks weighing less than 5 kg are not accepted by Kerala merchants. It will be found from the table that sharks fetch more prize than rays and bigger sharks fetch prize comparable to *Hilsa* which has a high local demand. This has made the fishermen to resort to shark fishing.

The master hooks are supplied by merchants from Kerala on payment. The price of one set of master hooks and lines with 100 hooks of 15.4 cm size and accessories is given below:-

1. Rate per 100 piece of master hooks and accessories	Rs.	14,000.00
2. Garware rope of 0.8 cm thickness about 60 kg	Rs.	6,600.00
3. 30 pieces of 5 litre jerican	Rs.	180.00
4. Fitting charges	Rs.	1,000.00
Total cost	Rs.	21,780.00

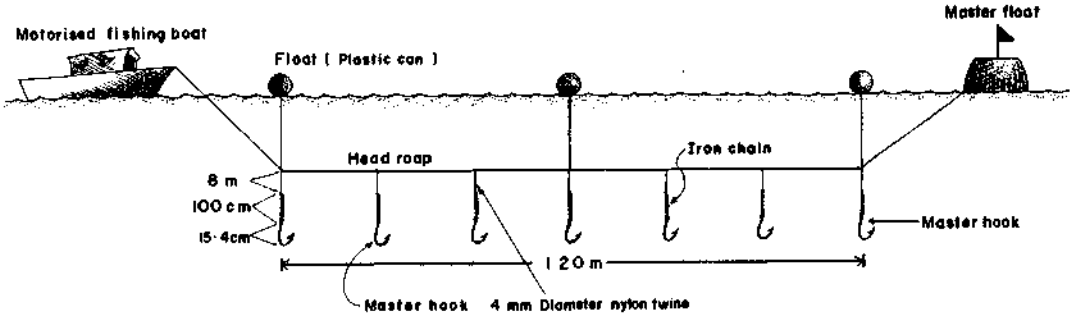
The hooks are of different sizes with numbers 0/0, 0/1, 0/2 and 0/3 and measure 6, 5, 4 and 3 inches respectively. The cost of individual hook varies from Rs. 60 to 80 depending on size.

OPERATION OF HOOKS AND LINES

Note:-

Total cost of one hook assembly is given below:-

1. Cost of one hook of size 15.4 cm	Rs.	80.00
2. Cost of 100 cm iron chain	Rs.	30.00
3. Cost of plastic twine of 8m length and 0.4cm thickness (heavy monofilament twine)	Rs.	30.00
Total cost of hook assembly	Rs.	140.00



* Prepared by Bijoy Krishna Burman, Contai Field Centre of C.M.F.R.I., Contai - 721401

TABLE 1. *Unit - wise catch of different species of elasmobranchs and other fishes landed (weight in kg) at Kakdwip by hooks and line during Oct. '92 to Feb. '93*

Serial No. of the units	Number of trips	Craft's length (m)	H.P. of the engine	Total working days	Number of hauls	Actual fishing hours	Man power employed	Name and weight of the sharks (kg)				A	Catch of sharks per trip	Name and weight of the skates (kg)			B	Catch of skates per trip	C	A+B+C	Catch of elasmobranchs per trip	Catch of other fishes per trip
								Carcharhinus sorrah	*Carcharhinus melanopterus*	*Carcharhinus longimanus*	*Other Sharks*	Total weight of sharks		*Rhinobatos granulatus*	*Rhynchobatus djiddensis*	*Pristis* spp.	Total weight of skates (kg)		Total weight of other fishes	Total weight of sharks, skates and other fishes		
1	10	16	72	79	219	1095	9	4,530	1,300	875	1,232	7,937	793.7	1,800	975	-	2,775	277.5	904	11,616	1,071.2	90.4
2	7	16	72	53	160	800	8	2,831	500	730	1,500	5,561	794.4	1,100	630	175	1,905	272.1	1,015	8,481	1,066.6	145.0
3	9	14	68	79	219	1095	8	3,900	1,200	800	975	6,875	763.9	1,200	430	-	1,630	181.1	1,021	9,526	945.0	113.4
4	5	19	102	44	136	680	7	2,400	1,500	760	500	5,160	1032.0	875	200	120	1,195	239.0	755	7,110	1,271.0	151.0
5	6	18	98	48	170	850	8	3,035	900	675	900	5,510	918.3	900	500	180	1,580	263.3	942	8,032	1,181.7	157.0
6	9	19	98	66	229	1,145	10	4,080	1,600	1,100	1,500	8,280	920.0	620	375	-	995	110.6	740	10,015	1,030.5	82.2
7	7	16	68	51	161	805	8	2,700	1,200	830	975	5,705	815.0	250	280	90	620	88.6	640	6,965	903.6	91.4
8	6	17	72	41	126	630	7	1,830	1,100	1,000	1,200	5,130	855.0	357	300	-	657	109.5	483	6,270	964.5	80.5
Grand total	59	-	-	461	1,420	7,100	65	25,306	9,300	6,770	8,782	50,158	6892.4	7,102	3,690	565	11,357	1,541.7	6,500	68,015	8,434.1	910.9

TABLE 2. *Unit wise catch of different species of Elasmbranchs and other fishes landed at Kakdwip by gillnet and hooks and line combination during Oct.'92 to Feb.'93 (weight in kg)*

Serial No. of the units	Number of trips	Craft's length (m)	H.P. of the engine	Total working days	Number of hauls	Actual fishing hours	Man power employed	Name and weight of the sharks (kg)				A	Catch of sharks per trip	Name and weight of the skates (kg)			B	Catch of skates per trip (kg)	C	A+B+C	Catch of elasmobranchs per trip	Catch of other fishes per trip
								Carcharhinus sorrah	*Carcharhinus melanopterus*	*Carcharhinus longimanus*	Other sharks	Total weight of sharks		*Rhinobatos granulatus*	*Rhynchobatus djiddensis*	*Pristis* spp.	Total weight of sharks (kg)		Total weight of other fishes (kg)	Total weight of sharks, skates and other fishes		
1	3	19	120	25	37	185	14	1,400	375	450	800	3,025	1,008.3	280	500	-	780	260.0	475	4,280	1,268.3	158.3
2	6	14	70	46	76	380	12	2,000	1,100	775	630	4,505	750.8	250	100	150	500	83.3	383	5,388	834.2	63.8
3	4	18	98	29	52	260	12	1,200	800	730	600	3,330	832.5	430	280	-	710	177.5	302	4,342	1,010.0	75.5
4	5	14	72	36	54	270	12	1,575	830	420	500	3,325	665.0	450	200	180	830	166.0	156	4,311	831.0	31.2
5	3	19	120	21	31	155	14	1,200	800	630	750	3,380	1126.7	500	300	120	920	306.7	186	4,486	1,433.3	62.0
6	3	19	120	23	40	200	12	1,500	1,220	735	450	3,905	1301.7	140	150	100	390	130.0	190	4,485	1,431.7	63.3
Grand total	24	-	-	180	290	1,450	76	8,875	5,125	3,740	3,730	21,470	5685.0	2,050	1,530	550	4,130	1,123.5	1,692	27,292	6,808.5	454.2

TABLE 3. *Size, weight and price of sharks and skates at the landing centre caught by hooks and line*

Species name	Size range (cm)	Weight range (kg)	Rate (Rs) with all fins per kg	Rate (Rs) without fins/kg	Rate (Rs) of the dry fins per kg
Carcharhinus sorrah	100 - 150	65 - 95	35.00 - 40.00	18.00 - 20.00	850 - 1500
	150 - 200	100 - 150	40.00 - 45.00	20.00 - 25.00	1500 - 2500
Carcharhinus melanopterus	100 - 150	50 - 75	30.00 - 35.00	15.00 - 18.00	1000 - 1500
Carcharhinus longimanus	100 - 150	60 - 85	30.00 - 35.00	15.00 - 18.00	800 - 1400
	150 - 200	100 - 150	40.00 - 45.00	30.00 - 35.00	1000 - 2000
Rhinobatos spp	150 - 230	100 - 125	18.00 - 20.00	12.00 - 15.00	350 - 600

ON THE LANDING OF A TIGER SHARK AND SKATE AT DIGHA, CONTAI, WEST BENGAL*

A Tiger shark (*Galeocerdo cuvieri*) and a Skate (*pristis microdon*) were landed on 23.12.1992 at Digha, near Contai, West Bengal by a gill netter which operated *Baram gill net* of 17.5 cm mesh size, 1600 m length and 14 m depth. The fishing was done 55 km away from the coast at about 40 m. The morphometric measurements of the fishes are given in Table 1.

TABLE 1. *Morphometric measurements of the Tiger shark and the Skate landed at Digha*

	Measurements in cm	
	G.cuvieri	*P.microdon*
Total length	500	540
Tip of mouth to 1st gill opening	44	-
Tip of mouth to last gill opening	65	-
Tip of mouth to origin of Ist dorsal fin	140	130
Tip of mouth to end of Ist dorsal fin	192	-
Distance between end of Ist dorsal fin and origin of 2nd dorsal fin	140	110
Distance between posterior border of 2nd dorsal fin to origin of caudal fin	81	49
Length of caudal fin	80	99
Height of upper caudal lobe	87	88
Height of lower caudal lobe	40	-
Width of 2nd dorsal fin	40	-
Height of 2nd dorsal fin	18	41
Length of pectoral fin	40	83
Height of pectoral fin	57	50
Height of body at origin of Ist dorsal fin	65	49.5
Height of body at origin of 2nd dorsal fin	55	-
Teeth	-	-
Teeth in upper jaw	20 rows	-
Teeth in lower jaw	20 rows	-
Tip of rostral to tip of caudal fin	-	540
Tip of rostral to origin of mouth	-	114
Height of Ist dorsal fin	-	46
Weight	500 kg	600 kg

Fig. 1. *Galeocerdo cuvieri*

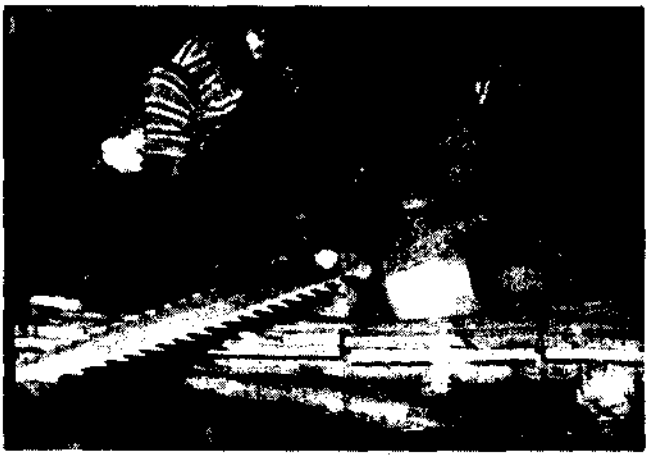


Fig. 2. *Pristis microdon*

* **Reported by Bijoy Krishna Burman, Contai Field Centre of C.M.F.R.I., Contai - 721 401.**

आन्ध्रप्रदेश के काकिनाडा तट पर खाद्य शुक्ति *क्रासोस्ट्रिया माड्रासेनसिस* और हरित शंबु *पेरना विरिडिस* के संवर्धन की साध्यताएं

जी. सयदा रॉव, के. आर. सोमयाजुलु और पी. अच्चय्या

केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान का काकिनाडा अनुसंधान केन्द्र, काकिनाडा - 533 004.

आमुख

आन्ध्रप्रदेश के काकिनाडा में स्थित काकिनाडा मात्स्यिकी पोताश्रय, चोलांगी और उप्पाडा में खाद्य शुक्ति *क्रासोस्ट्रिया माड्रासेनसिस* के संस्तर पाये जाते हैं । यह जाति साल भर अंडजनन करती है ।केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान के टूटिकोरिन अनुसंधान केन्द्र में मुक्ता संवर्धन की तकनोलजी का विकास किया है । जलकृषि तकनोलजी स्थानीय प्रधान होने के कारण काकिनाडा में इसकी क्षमता का परीक्षण करने केलिए खाद्य शुक्ति पर परीक्षणात्मक अध्ययन चलाया ।

मुक्ता शुक्ति संवर्धन केलिए पहले चलाया गया स्थल परक्षिण सफल नहीं हुआ था । वर्तमान परीक्षण केलिए रेन संवर्धन रीति का चयन किया गया था । काकिनाडा मात्स्यिकी पोताश्रय के ज़रिए इस परीक्षण का अच्छा प्रचार किया गया और मछुआरों के बीच रेन की सुरक्षा की आवश्यकता समझाया जिसका अच्छा परिणाम भी हुआ था ।

खाद्य शुक्ति संवर्धन पर अध्ययन

परीक्षण - I

क्लच (clutch) के रूप में मुक्ता कवचों का उपयोग करके टूटिकोरिन में रेन का निर्माण किया था । हर एक रेन की लंबाई 70 से मी हैं जिसमें क्लच के रूप में 5 से 6 मुक्ता कवच होते हैं । हैचरी में उत्पादित 6 से 7 स्पाट क्लचों में लगा दिया । इस प्रकार के 12 रेन 26-2-92 को काकिनाडा को परिवहित किया और काकिनाडा के मात्स्यिकी पोताश्रय में एक क्षैतिज रस्सी से लटका दिया, जिसे पोताश्रय जेटी के दो कांक्रीट खंभों में बाँध दिया था ।

काकिनाडा में संग्रहण के समय शुक्ति स्पाटों का आमाप 10 से 55 मि मी की बीच देखा गया और सबसे छोटा 27 मि मी का था । शुक्तियों के बढती का नियमित मोनिटरन किया गया । माहिक अंतराल में शुक्तियों को बारनक्लिस, सेरपुलिड्स आदि से स्वच्छ बना दिया । शुक्तियों को 255 दिनों के बाद 2-11-92 को संग्रहित किया । इसकी वास्तविक संवर्धन अवधि 280 दिन है । संग्रहण के समय शुक्तियों का आमाप 40 से 105 मि मी के बीच और भार 35 ग्रा से 148 ग्रा के बीच होता है । मांस का भार औसत 6.5 ग्रा के साथ 2.4 ग्रा से 21 ग्रा के बीच देखा गया ।

शुक्तियों की अतिजीवितता दर 83% थी । जेटी के खम्भों में निरन्तर टकराने के कारण शुक्तियों का नाश होता था । प्रति मीटर रेन का उत्पादन 3.5 कि. ग्रा आकलित किया गया ।

परीक्षण - II

इस में क्लच के रूप में 6 कवचों को लेकर 18 रेन का निर्माण किया गया । इस में खाद्य शुक्ति कवचों के बदले हरित शंबु और विन्डो - पेइन शुक्ति कवचों का इस्तेमाल किया था । मात्स्यिकी बंदरगाह में पहले परीक्षण चलाये गये स्थान में 92 फरवरी के मध्य में रेन को लटका दिया । मार्च के अन्त में स्पाटों का सेट्टिल्मेन्ट देखा गया । हर महीने में शुक्ति स्पाटों की वृद्धि का मोनिटरन किया गया । माहिक अंतराल में इनको बारनाकिल्स, सेरपुलिड आदि दूषणकारी जीवों से स्वच्छ बना दिया । आगे भी शुक्ति स्पाटों का निरन्तर सेट्टिलमेन्ट देखा गया और रेन में संकुलता कम करने केलिए उनको अलग कर दिया गया । रेनों के लटकाने के 7 महीने के बाद, 1993 सितंबर के मध्य में शुक्तियों का संग्रहण किया गया ।

संग्रहण के समय शुक्तियों की ऊँचाई 28 से 105 मि मी देखी गयी और माध्य ऊँचाई 66 मि मी थी । भार 10 ग्रा से 112 ग्रा के बीच और माध्य भार 45.2 ग्रा देखा गया । मांस का माध्य भार 4.1 ग्रा था ।

हर कवच में औसत 6 कवचों को रख दिये थे ।

बस्ती में संसाधन (Curing) का प्रभाव

दूसरे परीक्षण में विन्डो - पेइन के कुछ कवचों को दो हफ्ते केलिए समुद्र जल में डुबोकर रखा था । अन्य कवचों की तुलना में इनमें शीघ्र बस्ती देखी गयी ।

पारिस्थितिक स्थितियाँ

संवर्धन स्थान के समुद्र जल की लवणता, तापमान और ऑक्सिजन मूल्यों का मॉनिटरन पूरे संवर्धन काल में किया गया। लवणता 12.5 पी पी टी और 34 पी पी टी के बीच देखी गयी। तापमान 23 से 27.5°C के बीच था और ऑक्सिजन 3.0 से 5.2 मिलि /लि के बीच विविधता दिखायी । पैरामीटरों में आधिक उतार - चढाव नहीं देखा गया ।

अभ्युक्तियाँ

पहले परीक्षण में शुक्तियों ने 9 महीनों में 72 मि मी की माध्य ऊँचाई प्राप्त की थी । टूटिकोरिन में एक वर्ष की अवधि में खाद्य शुक्तियाँ 80 - 90 मि मी का आमाप प्राप्त करते है । दूसरे परीक्षण में संवर्धन काल छे महीने में कम कर दिया गया और शुक्तियाँ 66 की मी की माध्य ऊँचाई प्राप्त की । इस आयाम में शुक्तियों का विपणन किया जा सकता हैं । वर्तमान अध्ययन की सूचना यह है कि यहाँ उथला पानी के विशाल क्षेत्र होने के कारण खाद्य शुक्ति संवर्धन केलिए यह क्षेत्र बिलकुल उपयुक्त है और यहाँ 6- 9 महीनों के मौसमी फसल की कृषि की जा सकती है । विन्डो - पेइन यहाँ पर्याप्त मात्रा में उपलब्ध होने के कारण शुक्ति कवचों की तुलना में विन्डो - पेइन कवच उचित होगा । यह भी नहीं विन्डो - पेइन कवच की शुक्ति की बस्ती और बढती केलिए अधिक स्थल भी है ।

हरित शंबु पर अध्ययन

काकिनाडा मात्स्यिकी पोताश्रय *पेरना विरिडिस* (हरित शंबु) केलिए बहुत अच्छा देखा गया । काकिनाडा मात्स्यिकी पोताश्रय में *सी. माड्रासेनसिस* के संवर्धन करते वक्त 1992 जुलाई में शुक्ति की रेन रस्सी में हरित शंबु स्पाटों की बस्ती देखी गयी । ये नवंबर महीने के मध्य तक माध्य 49.4 मि मी के साथ 33 से 81 मि मी लंबाइ रेंच में बढ गये थे । माध्य भार 13.3 ग्रा. था। शुक्तियों के संग्रहण करते समय शंबुओं को रेन से अलग कर दिया गया और । मी लंबाइ और 15 से मी चौडाई की लंबी नाइलॉन थैलियों में रख दिया । थैलियाँ को उसी क्षेत्र में ऊर्ध्वाधर स्थिति में लटका देता हैं । बाइसस के तंतुओं द्वारा थैली में शंबु फिर से जुड जाते है । 1993 मार्च के अन्त तक ये शंबु 80.1 मि मी की माध्य लंबाई के साथ 60 - 115 मि मी रेंच की लंबाई प्राप्त करते है । 67.7 ग्रा के माध्य भार के साथ 19 से 138 ग्रा तक के भार प्राप्त करते है । 80 मि मी लबाई में मांस अधिक था ।

दूसरे परीक्षण में शुक्ति रेन 1993 फरवरी में लटका दिया था । इसमें हरित शंबुओं की बस्ती अप्रैल में देखा गया और अगस्त के अन्त तक 65 मि मी की माध्य लंबाई प्राप्त की । माध्य भार 33 ग्रा और मांस का भार 9.2 ग्रा था ।

अभ्युक्तियाँ

वर्तमान परीक्षणों में हरित शंबुओं की वृद्धि दर काफी अच्छी थी। कालिकट में राफ्ट संवर्धन रीति से पाँच महीनों में हरित शंबू ने 80 मि मी का संग्रहणयोग्य आयाम प्राप्त किया । 1 मी × 15 से मी जालाक्षी की प्रति नाइलॉन थैली में उत्पादन लगभग 4 कि ग्रा था और मृत्यु दर बहुत ही कम थी।

इस अध्ययन से काकिनाडा खाडी के उथले पानी में 1 मी. लंबाई की नाइलान थैलियों में हरित शंबु संवर्धन की संभाव्यता व्यक्त होती है। इन नाइलॉन थैलियों का दुबारा उपयोग किया जा सकता है और यह संवर्धन रीति उथले जल में की जा सकती है।

आय से वंचित होनेवाले परंपरागत मछुए- तमिलनाडु के तंजाऊर पर चलाया नमूना अध्ययन

आर. सत्यदास, के. के. पी. पणिक्कर और ए. कणक्कन

आमुख

तकनीकी परिवर्तनों और तदनुसार मत्स्यन रीतियों में हुई प्रगति ने परंपरागत समुद्री मत्स्यन के प्रयासों को कम कर दिया है और मछुआरों की जीवनी में एक हद तक प्रगति भी लायी है। सरकार द्वारा मछुआरों की समाज - आर्थिक स्थिति सुधारने केलिए कई विकासात्मक योजनायें शुरु की हैं । इनमें कुछ योजनायें मत्स्य उत्पादन बढाने में और तटीय ग्रामीण सेक्टरों के लोगों को रोज़गार मिलने में सहायक हुई हैं । लेकिन चुने गये कुछ भारतीय मत्स्यन गाँवों में हाल ही में चलाये अध्ययन सूचित करता है कि मत्स्य उत्पादन की वृद्धि और मछली का उच्च मूल्य का लाभ मुख्यत: मध्यवर्तियों को मिलते है , मछली के असली उत्पादक इस से वंचित हो जाते हैं ।

आय का असमान वितरण और तदनुसार समुद्री मात्स्यिकी सेक्टार में अमीर और गरीबों के बीच की दूरी की बढती योजनकर्ताओं और सामाजिक वैज्ञानिकों को संवाद का विषय बन गाया है । तीव्र यंत्रीकरण कार्यक्रम ने परंपरागत मछुआरों के निकट तट में मत्स्यन करने की दावा से वंचित किया है । यह भी नहीं यंत्रीकृत और अयंत्रीकृत मछुआरों के बीच उनके मत्स्यन अधिकारों पर संघर्ष होता रहता है । इस स्थिति का निरन्तर मानिटरन अनिवार्य है । सी एम एफ आर आइ देश के चुने गये केन्द्रों में नियमित रूप से समाज अर्थिक सर्वेक्षण चलाता हैं । वर्तमान निरीक्षण तमिलनाडु के तंजावूर तट में स्थित कीचनकुप्पम और मल्लिपट्टनम में चलाया था। निरीक्षण के लक्ष्य निम्नलिखित थे ।

- मछुआरों के घर, साक्षरता, कुटुम्ब आदि से संबंधित सामाजिक जानकारी और धंधा की रीतियाँ आदि पर अध्ययन करना

- मत्स्यन उपकरणों के स्वामित्व और निवेश के स्तर का निर्धारण

- मछुआ कुटुम्बों के आय और व्यय का विश्लेषण और गॉव में उपलब्ध उधार सुविधाओं से वहनीय ऋणबाध्यता

- समाज - आर्थिक विकास के मार्ग में आनेवाले प्रतिबंध और इन्हें निकालने केलिए उपाय देना

डाटा और रीति विधान

तंजाऊर तट के मत्स्यन गॉवों में एक प्राथमिक निरीक्षण चलाया गया और पंचायत या गॉव के नेताओं से मिलकर मछुआ कुटुम्बों, आनायक और संभारों, मत्स्यन मौसम, विपणन रीतियों और अवसंरचनात्मक सुविधाओं की उपलब्धियों से संबन्धित सूचनाओं का संग्रहण किया गया । उपर्युक्त प्राथमिक निरीक्षण के आधार पर और परंपरागत मछुआ कुटुम्बों के आधिपत्य देखकर कीचनकुप्पम गॉव और मल्लिपट्टिनम को विस्तृत सामाजिक - आर्थिक सर्वेक्षण केलिए चुन लिया गया ।

परिणाम और चर्चा

निवास का प्रबन्ध

तटीय मछुओं की मुख्य समस्याओं में एक है निवास । अधिकांश मछुओं के पास ज़मीन नहीं है । मल्लिपट्टिनम के 51% और कीचनकुप्पम के 42% तट के बुलई पुलिन में छोटी छोटी झोंपडियों में रहते हैं । मल्लिपट्टिनम में केवल 15% और कीचनकुप्पम में केवल 13% पक्के घर में रहते हैं । निरीक्षण यह व्यक्त करता है कि तटीय क्षेत्र के घरों की यह बुरी हालत का कारण अपने अपने ज़मीन नहीं होने और आय एवं उधार सुविधाओं की कमी हैं ।

जनसंख्या, साक्षरता और रोज़गार

दोनों गाँवों के प्रत्येक घर में औसत 5 सदस्य होते हैं । साक्षरता की स्तर बहुत ही नीचे है । दोनों गाँवों में प्राथमिक स्तर की शिक्षा प्राप्त लोग 20% से कम है । रोज़गार के बारे में कहे जाए तो मल्लिपट्टिनम में 30% और कीचनकुप्पम में 32% कुछ नियमित धंधे करते हैं । यह देखने लायक बात है कि इन में मल्लिपट्टिनम के 70% और कीचनकुप्पम के 74% सक्रिय मत्स्यन करते हैं । स्त्रियाँ मात्स्यिकी से संबन्धित काम करती हैं । गरीबी के कारण मछुआ कुटुम्बों के स्कूल जानेवाले बच्चे भी मत्स्यन या मात्स्यिकी से संबन्धित कार्यों में लगे हुए हैं ।

उत्पादन माध्यमों का स्वामित्व

मल्लिपट्टिनम और कीचनकुप्पम के अधिकांश मछुओं के पास मत्स्यन केलिए पर्याप्त साधन नहीं हैं। मल्लिपट्टिनम अवतरण केन्द्र से यंत्रीकृत और अयंत्रीकृत प्लवक निर्मित पोतों का प्रचालन होता हैं । यंत्रीकृत पोतों से गिलजालों का प्रचालन होता है और 11% मछुओं के पास गिलजाल हैं । अयंत्रीकृत प्लवक निर्मित पोतों से कोयवलै का प्रचालन करता है । इसके ठीक प्रचालन केलिए इस जाल के 20 टुकडे की आवश्यकता है । लेकिन अधिकांश मछुआरों के पास कोयवलै के पर्याप्त टुकडे नहीं है । मछुआ कुटुम्बों में 50% के पास प्लवक निर्मित पोत हैं और उनमें 60% के पास गिलजालों के 10 टुकडे तक नहीं है । मछुआ कुटुम्बों में 43% के पास केवल जाल है और ये लोग साधारणतया अन्य पोतों में अपने जालों के साथ काम करने केलिए जाते हैं ।

कीचनकुप्पम तमिलनाडु के एक प्रमुख यंत्रीकृत अवतरण केन्द्र है । यद्यपि मछुआरों में अधिकांश लोग आज भी अपनी जीवनी केलिए कटामरीनों का सहारा लेते हैं । पूरे साल मौसमी उपलब्धता के अनुसार मत्स्यन करने केलिए विविध संपदाओं केलिए उचित गिलजाल चाहिए, जिससे अच्छा आर्थिक लाभ मिल सकता है । पर्याप्त जालों की कमी के कारण 75% मछुए उनके एककों का प्रभावी प्रचालन नहीं कर सके ।

मत्स्यन उपकरणों पर पूँजी निवेश

मल्लिपट्टिनम के 25% और कीचनकुप्पम के 53% मछुआ कुटुम्बों के पास मत्स्यन उपकरण का निवेश केवल 5000 रु. से

कम है । कीचनकुप्पम के 18% और मल्लिपट्टिनम के 17% कुटुम्बों ने यंत्रीकृत मत्स्यन एककों पर 50 हज़ारों से अधिक रुपये का निवेश किया है । अध्ययन से व्यक्त होता है कि मल्लिपट्टिनम के 64% और कीचनकुप्पम के 73% कुटुम्बों का मत्स्यन उपकरणों पर निवेश 10000 रु. से कम है ।

वार्षिक और प्रति शीर्ष आय

मल्लिपट्टिनम के मछुआ कुटुम्बों का वार्षिक औसत आय 11778 रु. और कीचनकुप्पम के मछुआ कुटुम्बों के वार्षिक औसत आय 8074 रु. है और प्रति कुटुम्ब का आय क्रमश: 2356/- रु. और 1615/- रु हैं । मल्लिपट्टिनम में 70% मछुआ कुटुम्ब मत्स्यन से अधिकतम आय प्राप्त करते है, 19% मात्स्यिकी से संबंधित क्रियाकलापों से और 11% अन्य क्रियाकलापों से आय कमाते है और कीचनकुप्पम में 81% लोग सक्रिय मत्स्यन से ,18% मात्स्यिकी से संबन्धित क्रियाकलापों से, बाकी अन्य क्रियाकलापों से आय कमाते हैं ।

मल्लिपट्टिनम के अधिकांश मछुआ कुटुम्ब जिनके मुख्य धंधा मत्स्यन है , वर्ष में 5000 - 15000 रु के बीच आय कमाते हैं । कीचनकुप्पम में मत्स्यन में लगे कुटुम्बों का वार्षिक आय 3000 - 9000 रु. है । उपर्युक्त दोनों स्थानों में मात्स्यिकी से सबंन्धित कार्यों में लगे हुए लोगों का आय प्रतिवर्ष 5000/- रु. से कम है । इसका कारण मत्स्यन क्रियाकलापों का मौसमी स्वभाव हैं ।

वार्षिक और प्रतिशीर्ष व्यय

मल्लिपट्टिनम के एक मछुआ कुटुम्ब का वार्षिक औसत व्यय 8685/- रु. और कीचनकुप्पम का 6508/- रु. हैं । वार्षिक प्रतिशीर्ष व्यय मल्लिपट्टिनम और कीचनकुप्पम में क्रमश: 1737/- रु. और 1302/- रु हैं । ये लोग सब से कम व्यय शिक्षा और चिकित्सा केलिए करते हैं, जिससे उनका सामाजिक - आर्थिक निम्न स्तर व्यक्त होता है ।

ऋणबाध्यता और उधार सुविधायें

मल्लिपट्टिनम के 220 कुटुम्बों में 83 (38%) और कीचनकुप्पम के 441 कुटुम्बों में 137 (31%) ऋणग्रस्त थे । मल्लिपट्टिनम और कीचनकुप्पम मछुआरों के कुल ऋण क्रमश: 9.5 लाख और 2.5 लाख आकलित किया गया है । यद्यपि मछुआ लोगों केलिए उधार अत्यधिक आवश्यक होने पर भी औपचारिक या अनौपचारिक पूँजी विपणी से उनके द्वारा लगाये हुए शर्तों का पालन नहीं कर पाने के कारण उनको ऋण नहीं मिल सकते । मत्स्य व्यापारियों और साहूकारों से ये लोग साधारणतया उधार लेते है । मल्लिपट्टिनम और कीचनकुप्पम के क्रमश: 54% और 61% एसे श्रोतों से उधार लेते है जिसकी ब्याज दर बहुत ज्यादा होती है और इसलिए मछुए हमेशा ऋणबाध्यता के वलय में पडे रहते है । 50,000/- रु . से अधिक वार्षिक आय के लोग यंत्रीकृत पोतों की खरीदी केलिए उधार लेते है ।

विपणन रीति

अवतरण केन्द्र में मछली का निपटान मुख्यत: नीलाम से होता है । शीघ्र ही सड जाने के कारण नीलाम बहुत तेज़ और स्पर्धा के साथ होता है । मल्लिपट्टिनम और कीचनकुप्पम मुख्य बाज़ारें है । लेकिन कीचनकुप्पम अवतरण केन्द्र के मछुए नागपट्टिणम यंत्रीकृत अवतरण केन्द्र में अपनी पकड बेचते हैं । यहाँ नीलाम में भाग लेने वालों की संख्या भी अधिक है और मछुओं को कीचनकुप्पम से बढकर मूल्य भी मिलता है । नीलाम करनेवालों में मछुआ स्त्रियाँ अधिक है ।

मछली शीघ्र सडने के कारण इसका निपटान तोल के नहीं करते है । इसलिए मछली का निपटान ढेर लगाके किया जाता है । नीलाम में थोक बिक्रेताओं और खुदरा व्यापारियों ने भाग लिया। मल्लिपट्टिनम और कीचनकुप्पम के मत्स्य अवतरण में लगभग 25 से 35% का विपणन खुदरा व्यापारियों द्वारा निकटवर्ती बाजारों में होता है । केरल के व्यापारियाँ भी यहाँ से मछली खरीदते है । अनेक संसाधन प्लान्टों के प्रशीतित वान निर्यातयोग्य मछलियों के संग्रहण केलिए मल्लिपट्टिनम और कीचनकुप्पम में आते है ।

निष्कर्ष और नीति विवक्षा

अध्ययन से व्यक्त होता है कि तंजाऊर तट के अधिकांश मछुआ कुटुम्ब छोटी छोटी झोंपडियों में रहते हैं । उनके आय बहुत कम है और साक्षरता 20% के नीचे हैं । अध्ययन यह भी व्यक्त करता है कि परंपरागत मछुआरों के पास पर्याप्त मत्स्यन उपस्कर नहीं है । उधार सुविधायें भी बहुत कम हैं । इस प्रकार अव्यवस्थित आर्थिक स्थिति और संस्थानीय अभिकरणों से वित्तीय सहायता की अनुपलब्धि, के कारण कम सज्जित उपकरणों से मत्स्यन करने पडते हैं जिसका असर लाभ में भी पडता हैं । मत्स्यन उद्यमों के विशेष स्वभाव पर ध्यान देकर वाणिज्यिक बैंकों और फिशरमेन कोआपरे टीव सोसाइटियों को सरल उधार नीतियों

का निर्माण करनी चाहिए । अधिकाशं मछुओं के पास उधार के बदले में गिरवी रखने केलिए कुछ मूल्यवान चीज़ है ही नहीं । तट के सभी राष्ट्रीयकृत बैंकों की शाखाओं में मछुओं को उधार देने केलिए अलग अलग योजनाएं होनी चाहिए । पिछले कुछ सालों में कटामरीनों का मूल्य ज्यादा बढ गया है । इसका कारण इस क्षेत्र में मध्यवर्गीय लोगों का आगमन है । अत: राज्य मात्स्यिकी विभाग को वन विभाग से परामर्श करके आवश्यक कदम उठाना चाहिए ।

विपणन सुविधाओं की कमी मछुआरों के कम आय का और एक कारण है । हर मत्स्यन गाँव में हिमशीतीकरण प्लान्ट या अन्य भंडार सुविधाओं का प्रारंभ नहीं किया जा सकता । लेकिन फिशरमान कोओपरेटीव सोसाईटियों द्वारा कुछ गाँवों केलिए ऐसी सुविधाओं का प्रबन्ध किया जा सकता है । स्थानीय सरकारी अभिकरणों द्वारा अच्छे रोड का और अवतरण केन्द्र के पास बस स्टोप आदि का निर्माण करना चाहिए जिससे मत्स्य विपणन में प्रगति आ सकती है । मछुआरों में साक्षरता दर बिलकुल कम है और राष्ट्रीय वयस्क शिक्षा कार्यक्रम और राज्य द्वारा प्रायोजित अरिवोलियाक्कम के कार्यक्रम तटीय क्षेत्रों में और भी तीव्र बनाना चाहिए ।

मछुओं की समाज - आर्थिक स्थिति सुधारने केलिए विस्तृत और समाविष्ट क्षेत्र विकास कार्यक्रम की आवश्यकता है। तट के निकट विस्तृत भूमि उचित उपयोग के बिना पडी रहती है । इसमें जलकृषि और मिट्टी की गुणता के अनुसार कैसुएरिना, काजू, नारियल आदि की कृषि की जा सकती है ।

जिस प्रकार महा नगरों में नगर योजनायें है इस प्रकार हर मत्स्यन केन्द्र / गाँव में इसके विकास केलिए समाविष्ट कार्यक्रमों की आवश्यकता है ।

आन्ध्रप्रदेश के श्रीकाकुलम जिले में झींगा बीज संग्रहण *

श्रीकाकुलम जिले के उत्तर से गेड्डालपाडु तक के अवतरण केन्द्रों में मछुए झींगा बीज संग्रहण केलिए प्लास्टिक मछर जाल, हस्त जाल और नाईलॉन ''जोली वलै'',''टोका वलै''के उपयोग करते है जो सफेद, हरा, गुलाबी, पीत और नील रंग के होते है । बीजों का संग्रहण 0.5 से 1.5 मी गहराई के फेनिल क्षेत्रों से किया जाता है । तरुणों की लंबाई 1 से 2 से मी के बीच होती है। कुछ तरुणों का रंग सफेद और कुछ तरुणों का धीमी लाल रंग होते है। । 100 झींगा बीजों की कीमत 25 से 100 रु. है । अभी हाल 100 बीजों की कीमत 40 से 45 रु हो गया है । व्यापारियों की माँग के अनुसार झींगा बीजों की कीमत में उतार चढाव आता है। काकिनाडा, भीमावरम, मछलीपट्टनम, विजयवाडा, राजमुन्दिरी आदि केन्द्रों के व्यापारियाँ यहाँ से झींगा बीज खरीदते है । मछुआ समुद्र की अवस्था और बीजों की उपलब्धि के अनुसार दिन या रात में बीजों का संग्रहण करते है । श्रीकाकुलम में भावनापाडु, अलताडा, नुवाल्ला रेवु, मंचिनीलपेट्टा, कोतुरु, गोलागान्डि, पेड्डारकारिवानिपालम,ईडुवानिपालम,कोताकलिगपट्टनम,डोंकुरु और गेड्डालपाडु आदि केन्द्रों में झींगा बीजों की प्रचुरता है । इस साल जून महीने के तीसरे हफ्ते में झींगा बीज संग्रहण शुरु हुआ । प्रारंभ में झींगा बीज कम था लेकिन क्रमश: बीजों की संख्या बढ गयी । अगस्त महीने की आखिरी हफ्ते में बीजों की संख्या कम हो गयी । इन दोनों महीनों में हज़ारों मछुए और अन्य व्यापारियों को काफी लाभ मिला और आज तक हर मछुआ कुटुम्ब को लगभग 10,000/- से 18,000/- रु. के बीच आय मिला है।

''जोली वलै'' और ''टोका वलै'' का प्रचालन

जाल बाँधे हुए दो लाठियों को 0.5 से 1.5 मी गहराई में स्थापित करते है । 20 मिनट के बाद जाल उठाता है । समुद्र जल भरे प्लास्टिक टबों में बीजों का संग्रहण करते है । व्यापारियाँ इन्हें समुद्र जल और ऑक्सिजन भरे पॉलिथीन बैगों में डालकर परिवहन करते है ।

* सी एम एफ आर आइ के पलशा क्षेत्र केन्द्र के बी अच्युत रॉव द्वारा तैयार की गयी रिपोर्ट

आन्ध्रप्रदेश के पूर्व तट में स्थित विशाखपट्टनम और विज़ियानगारम जिले के तट से झींगा (*पेनिअस मोनोडोन*) बीज का विदोहन *

आजकल झींगा व्यवसाय इसके लाभार्जन और निर्यात मूल्य के कारण अत्यधिक आकर्षक बन गया है और इसकी माँग दिन - ब - दिन बढती जाती है । आन्ध्रप्रदेश के विशाखपट्टनम और विज़ियानगारम जिलों में अनेक झींगा और जलकृषि फार्मों का आर्विभाव हुआ । कई जगहों पर कृषि भूमि और तटीय क्षेत्र झींगा फार्म के रूप में परिवर्तित किया गया । इसके परिणाम स्वरूप झींगा बीजों की माँग बढ गई है ।

आन्ध्रप्रदेश में पब्लिक सेक्टर में केवल एक स्फुटनशाला है जो विशाखपट्टनम में 'टासपार्क' के द्वारा प्रचालित किया जाता है और प्राईवेट सेक्टर में तीन या चार स्फुटनशालाएं है । इनके ज़रिए सभी झींगा कृषकों की माँग पूरी नहीं हो जाती । इसलिए मछुओं की माँग पूर्ति केलिए फेनिल क्षेत्र से झींगा बीजों का संग्रहण शुरू किया गया । इसकी शुरुवात जुलाई 1994 में विशाखपट्टनम जिले के नरसापुरम और रामबिल्लि और विज़ियानगारम जिले के तोट्टपल्लिमुक्कम मत्स्यन गाँवों में हुई और 1994 सितंबर तक उपर्युक्त दोनों जिले के सारे गाँवों में फैल गया

झींगा बीज संग्रहण केलिए प्रयुक्त जाल 2.5 मी लंबाई और 0.5 मी चौडाई के नियत बैग जाल हैं,जिसकी लागत 250-300 रु होती है । इस जाल के प्रचालन केलिए दो व्यक्तियों की आवश्यकता है । एक दिन एक जाल से 20 प्रचालन किया जा सकता है । एक खींच केलिए लगभग 20 मिनट लगता है । हर एक खींच से प्राप्त बीजों को समुद्र जल भरे प्लास्टिक टबों में डालते है । इन बीजों को मध्यवर्ती लोगों को बेचते है ।

जुलाई 1994 में 100 बीजों केलिए 30 रु. थे और बढती माँग के कारण सितंबर, 1994 में यह बढकर 60/- रु. हो गये ।

झींगा बीज संग्रहण बूढे मछुओं को, जिन्होंने मत्स्यन कार्यकलाप छोड दिया था आय कमाने का तरीका बन गया।

* एम. सत्य रॉव. एस. चन्द्रशेखर, एम. प्रासाद रॉव, जे. बी. वर्मा, एम . एस. सुमित्रुडु और के. नारायण रॉव द्वारा तैयार की गयी रिपोर्ट

पाक खाडी के तट के निकट *एसेटस* जातियों की असाधारण उपस्थिति पर टिप्पणी *

पश्चिम और पूर्व तटों से सेरजिड झींगा *एसेटस* जातियों का अवतरण रिकार्ड किया गया है । भारत के कुल नॉन पेनिआइड झींगों में 75-80% एसेटस जातियाँ होती है । मात्र महाराष्ट्र से उपर्युक्त नॉन - पेनिआइड झींगों का वार्षिक अवतरण 56,000 टन आकलित किया गया है । तमिलनाडु तट के कुछ भागों से भी इसके अवतरण की सूचना मिली है । लेकिन पाक खाडी तट पर इसकी उपस्थिति की कोई सूचना नहीं है ।

तोण्डी के निकट स्थित एम. वी. पट्टिनम यंत्रीकृत अवतरण केन्द्र में 21-6-'94 को एसेटस जातियों केलिए मत्स्यन किया गया । इस जाति केलिए प्रयुक्त मत्स्यन, जिसे चेल्लाकूनी कहते है घुटनों तक की गहराई में चलाया । इसकेलिए मच्छर - दानी या साधारण साडियों का इस्तेमाल करते है ।

मत्स्यन सिर्फ दो दिनों केलिए किया था । पकड लगभग 500 कि. ग्रा. थी । धूप में सुखाये गये एसेटस जातियों के नम्बुतलै बाज़ार में प्रति मद्रास तुला केलिए 10 रु. की दर में बेच दिया गया ।

एसेटस जातियों का आमाप 15 मि मी से 25 मि मी तक के रेंच में था ।

सी. एम. एफ. आर. आइ. के मण्डपम क्षेत्रीय केन्द्र के ए. गणपति द्वारा तैयार की गयी रिपोर्ट

आन्ध्रप्रदेश के वाडालरिवु मत्स्य अवतरण केन्द्र में नीलाम का तरीका *

वाडालरिवु मत्स्य अवतरण केन्द्र में चार पाँच नीलामकर्ता होते है । उनका चयन वाडालरिवु गाँव के अध्यक्ष, सचिव आदि श्रेष्ठ व्यक्तियों द्वारा किया जाता है । इस प्रकार चुन लिये गये नीलाम कर्ता गाँव के वरिष्ठों को प्रतिवर्ष 30,000 /- रु देते हैं इस रकम से गाँव में मुत्यालम्मा सम्बालालू नामक त्योहार मनाते है। यह त्योहार हर वर्ष जनवरी में तीन दिन केलिए मानाया जाता है ।

प्रचालन के बाद तट वापस आते वक्त मछुआ लोग पोत में ही मछलियों को वर्ग के अनुसार छाँटते है । मछुआ पकड तट पर लाते ही नीलामकर्ता नीलाम शुरू करते है । नीलाम कर्ता छाँटी मछलियों के हर वर्ग से एक बडी मछली प्रभार के रूप में ले लेते है । मछली लाने वालों को नीलाम करने का अधिकार नहीं है। इस गाँव में पोत के मालिकों को भी मछली का क्रय करने का अधिकार नहीं है । नीलाम के समय जो व्यापारी मछली चाहता है वह 'चो', कहता है जिससे वह मछली खरीदने की अपनी सहमति प्रकट करता है । नीलाम के बाद नीलामकर्ता हर वर्ग से नीलाम प्रभार के रूप में ली गयी मछलियाँ बिकते है । एक नीलामकर्ता प्रति दिन 250/- से 300./ रु तक अर्जित करता है । प्रतिवर्ष नीलाम कर्ता 70,000 से 75,000 /-रु तक प्राप्त करते है। उपर्युक्त 70,000 /- रु. से नीलामकर्ता 30,000/- रु. गाँव में त्योहार मनाने केलिए देते है और बाकी रकम त्योहार के बाद एक समान बाँटते है ।

इस प्रकार नीलामकर्ता को प्रतिवर्ष 7,000/- से 8,000/- रु प्राप्त होता है ।

इस गाँव में तीन या चार वर्षों से ऐसी प्रथा चलती रहती है ।

* सी एम एफ आर आइ के नरसापुर क्षेत्रीय केन्द्र के श्री पी. आनन्द रॉव द्वारा तैयार की गयी रिपोर्ट ।

पश्चिम बंगाल के काकद्वीप में सुरा अवतरण *

काकद्वीप में 1992 से काँटा डोर का प्रचालन होता है । इसका प्रचालन मौसम अक्तूबर से फरवरी तक पाँच महीने हैं । अन्य महीनों में 18 से 19 मी लंबाई के 72 से 120 तक की अश्व शक्ति के आन्तरिक ईंजन लगाये हुए गिलजालों का प्रचालन होता है । काँटा डोर का उपयोग करने वाले एककों में प्रति एकक काँटों की संख्या 70 - 100 के बीच था और काँटा डोर के साथ गिलजाल प्रचालन करने वाले एककों में प्रति एकक काँटों की संख्या 30 - 50 के बीच थी । इन एककों का प्रचालन तट से 80 - 100 कि मी क्षेत्र में 40 - 45 मी गहराई में किया था । डोलफिनों और सर्प मीनों को 250 - 400 ग्रा. के टुकडों में काटकर चारे के रूप में उपयोग किये थे ।

पकड में प्राप्त सुरा और शंकुशों को केरल के व्यापारियों को और अन्य मछलियों को स्थानीय व्यापारियों को बेच दिया । 5 कि. ग्रा से कम भार वाली सुराओं को केरल के व्यापारियों ने स्वीकार नहीं किया । सुरा और शंकुशों में सुराओं का मूल्य अधिक था । मत्स्यन केलिए मास्टर हुकों का वितरण भुगतान पाकर केरल के व्यापारियों ने किया था ।

* सी एम एफ आर आइ के कोन्टाई क्षेत्र केन्द्र के बिजोय कृष्ण बर्मन द्वारा तैयार किया गया लेख

डिग्गा अवतरण केन्द्र में पुलि सुरा (*गलियोसेरडो कुविरी*) और स्केट्स (*प्रिस्टिस माइक्रोडोन*) का अवतरण *

डिग्गा अवतरण केन्द्र में 23-12-92 को एक यंत्रीकृत गिलजाल के ज़रिए पुलि सुरा और शंकुचि (स्केट्स) की दो जातियों का अवतरण हुआ । *प्रिस्टिस माइक्रोडोन* मादा जाति की थी। इसकी कुल लंबाई 540 से मी और कुल भार 60 कि ग्रा थे *गलियोसेरडो कुविरी* की कुल लंबाई 500 से मी और कुल भार 500 कि ग्रा थे । इन्हें 25-12-'92 से 27-12-'92 तक प्रदर्शन केलिए रखा और इसके बाद एस. डी. एस और जी. आर कंपनी ने संयुक्त रूप से 12000/- रु. पर खरीद लिया। फिर संसाधन करके 29-12-'92 को केरल को उच्च मूल्य पर बेच दिया ।

* सी. एम. एफ. आर. आइ के कोन्टाइ क्षेत्र केन्द्र के बिजोय कृष्ण बर्मन द्वारा तैयार की गयी रिपोर्ट

Edited by Dr. K. J. Mathew with assistance from Ms. Geetha Antony and Ms. P.M. Geetha. Published by Dr. K.J. Mathew on behalf of the Director, Central Marine Fisheries Research Institute, P. B. No. 1603, Dr. Salim Ali Road, Cochin - 682 014, Kerala, India. Printed at Modern Graphics, Azad Road, Cochin - 682 017.